Schools at Meadowbank Education and Employment Precinct (SMEEP) – Attended Construction Noise Survey – 15th September 2021

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1 INTRODUCTION

Pulse White Noise Acoustics Pty Ltd (PWNA) has been engaged to undertake an attended construction noise survey during a period of typical construction activities at the Schools at Meadowbank Education and Employment Precinct (SMEEP) construction site at 2 Rhodes Street, Meadowbank NSW 2114.

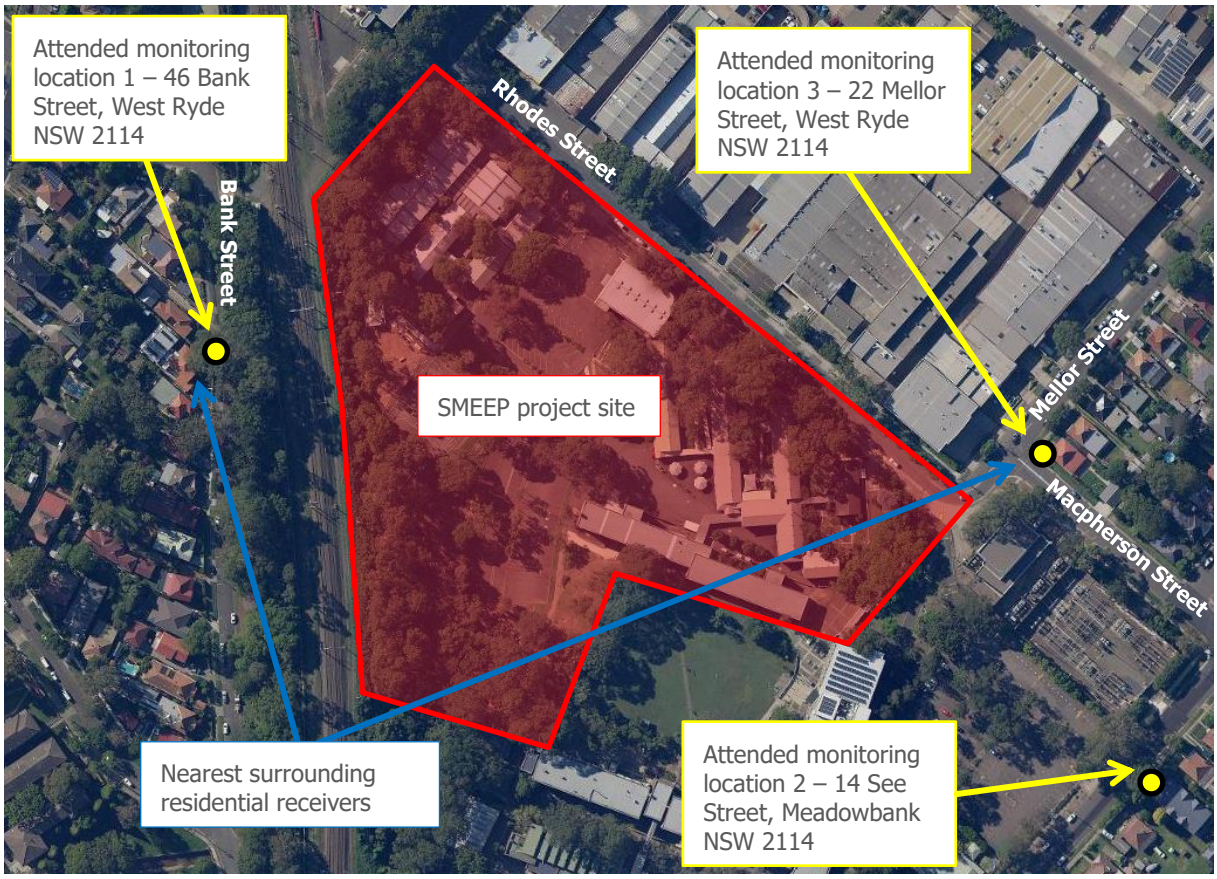
This report details the attended survey which was undertaken on the Wednesday 15th September 2021 to assess the acoustic impact of construction noise on the nearest residential receivers such that the acoustic requirements of the *Conditions of Consent* are complied with.

1.1 Development Description

The proposed development includes the construction of a new school project on the site. The surrounding receivers to the site include residential receivers located on Macpherson Street and Mellor Street to the east of the site, as well as Bank Street to the west of the site (across the railway lines).

The site location, in relation to surrounding buildings, is shown in Figure 1 below.

Figure 1 Site location, location of surrounding receivers, and locations of attended noise measurements – sourced from SixMaps NSW



2 EXISTING ACOUSTIC ENVIRONMENT

Existing environmental noise levels at the site are dominated by traffic noise generated predominantly from surrounding roadways.

As part of the previously conducted *Construction Noise and Vibration Management Sub-Plan (ref:20200342.2/1007A/R1/TH)* dated 10/7/2020, background noise levels have been measured at the site which will be used in this assessment.

A summary of the acoustic survey is detailed in the table below.

Table 1 Results of Noise Survey at the Site

Measurement Location	Time of Measurement	$L_{A90,\ 15min}$ dB(A)	Comments
Macpherson Street Residence	Day (7am to 6pm)	52	Noise level at the site was dominated by vehicle movements on surrounding roadways.
	Evening (7pm to 10pm)	52	
	Night (10pm to 7am)	42	

3 CONSTRUCTION NOISE CRITERIA

This section of the report details the relevant project construction noise criteria.

3.1 Construction Noise

The assessment of construction noise impacts generated from the site has been undertaken in accordance with the requirements of the EPA Interim Construction Noise Guideline.

The EPA's Interim Construction Noise Guideline defines normal day time hours as the following:

Figure 2 NSW EPA ICNG Excerpt – Section 2.2

2.2 Recommended standard hours

The recommended standard hours for construction work are shown in Table 1; however, they are not mandatory. There are some situations, as described below, where construction work may need to be undertaken outside of these hours. The likely noise impacts and the ability to undertake works during the recommended standard hours should be considered when scheduling work.

Table 1: Recommended standard hours for construction work

Work type	Recommended standard hours of work*
Normal construction	Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays
Blasting	Monday to Friday 9 am to 5 pm Saturday 9 am to 1 pm No blasting on Sundays or public holidays

* The relevant authority (consent, determining or regulatory) may impose more or less stringent construction hours.

3.2 Construction Noise Goals

This section of the report details the relevant construction noise criteria which is applicable to the site including the EPA's *Interim Construction Noise Guideline* (ICNG).

3.2.1 Interim Construction Noise Guideline

Noise criteria for construction and demolition activities are discussed in the *Interim Construction Noise Guideline* (ICNG). The ICNG also recommends procedures to address potential impacts of construction noise on residences and other sensitive land uses. The main objectives of the ICNG are summarised as follows:

- Promote a clear understanding of ways to identify and minimise noise from construction works;
- Focus on applying all "feasible" and "reasonable" work practices to minimise construction noise impacts;
- Encourage construction to be undertaken only during the recommended standard hours unless approval is given for works that cannot be undertaken during these hours;
- Streamline the assessment and approval stages and reduce time spent dealing with complaints at the project implementation stage; and
- Provide flexibility in selecting site-specific feasible and reasonable work practices in order to minimise noise impacts.

The ICNG contains a quantitative assessment method which is applicable to this project. Guidance levels are given for airborne noise at residences and other sensitive land uses.

The quantitative assessment method involves predicting noise levels at sensitive receivers and comparing them with the Noise Management Levels (NMLs). The NML affectation categories for receivers have been reproduced from the guideline and are listed in the table below.

Table 2 Noise Management Levels from Construction – Quantitative Assessment

Receiver Type	Time of Day	Noise Management Level $L_{Aeq(15minute)}$[1,2]	How to Apply
Residential	Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured LAeq(15minute) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
		Highly noise affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. • Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences. 2. If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

Note 1 *Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.*

Note 2 *The RBL is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours). The term RBL is described in detail in the NSW Industrial Noise Policy (EPA 2000).*

Based on the table above the suitable construction noise management levels for works undertaken on the site is detailed in the table below.

Table 3 Site Construction Noise Management Levels

Noise Source	Time Period	Receiver Type	Construction Noise Management Level	'Highly Noise Affected' Level
Construction Noise	Approved hours of construction	Residential	62 dB(A) LAeq (15min)	75 dB(A) LAeq (15min)

Note 1: Construction noise management levels based on the Interim Construction Noise Guideline

4 CONSTRUCTION NOISE TESTING

4.1 Noise Monitoring Equipment

The noise level survey was performed using a Brüel & Kjær 2250 Hand-held Analyser Type 2709757 (Unit) & 2726283 (microphone). Calibration of the sound level meter was checked with a Brüel & Kjær Type 4231 acoustical calibrator (serial number 3009148) prior to and following the measurements. Drift in calibration did not exceed ±0.5 dBA. All equipment carried current NATA calibration certificates. Attended measurements took place between 4:00pm and 5:00pm on Wednesday 15th September 2021.

Calibration certificate of the sound level meter used in the assessment is provided in Appendix B of this report.

4.2 Attended Noise Monitoring

This section of the report details the results of the construction noise testing undertaken at the site on the Wednesday 15th September 2021 during a period of typical construction activities.

The results of this acoustic assessment are detailed in the table below.

Table 4 Measured construction noise levels at residential receivers

Noise Source	Measurement Location	Measured Construction Noise Level dB(A) $L_{Aeq\ (15min)}$	Construction Noise Management Level/ 'Highly Noise Affected' Level	Comments
Construction Activities as per above.	**Location 1** 46 Bank Street, West Ryde	**58**	**Noise Management Level (NML)** 62 dB(A) LAeq (15min) **Highly Noise Affected Level (HNAL)** 75 dB(A) LAeq (15min)	Power tools were audible during most of the duration of the measurement. Local environmental noises were audible during the measurements including train pass-bys, vehicle pass-bys (non-construction related) and fauna and flora sounds. As such we can conclude general construction works associated with the school site are below both the NML and HNAL.
	Location 2 14 See Street, West Ryde	**57**		Power tools were occasionally audible during the duration of the measurement. We believe this was a contribution of mostly the TAFE NSW site (Hanson Yuncken). Local environmental noises were audible during the measurements including train pass-bys, vehicle pass-bys (non-construction related) and fauna and flora sounds. As such we can conclude general construction works associated with the school site are below both the NML and HNAL.
	Location 3 22 Mellor Street, West Ryde	**63**	**Noise Management Level (NML)** 62 dB(A) LAeq (15min) **Highly Noise Affected Level (HNAL)** 75 dB(A) LAeq (15min)	Power tools were occasionally audible during the duration of the measurement. Distant noise from the TAFE NSW site (Hanson Yuncken) was audible. Noise from civil works being undertaken at the front of the the TAFE NSW site (Hanson Yuncken) was audible, see photo below. Local environmental noises were audible during the measurements including train pass-bys, vehicle pass-bys (non-construction related) and fauna and flora sounds. As such we can conclude general construction works associated with the school site are slightly above the NML however below the HNAL.

Based on the results of the testing detailed in the table above the following can be concluded:

1. Construction noise levels at all locations are below the 'Highly Noise Affected Level' and therefore acceptable with some management.

2. Noise from other noise sources within the vicinity of the site including transportation and vehicle pass-bys were generating noise levels which were similar or greater than noise level generated from the operation of construction activities at Location 2 and 3 in particular.

Figure 3 Rhodes Street Civil Works TAFE NSW site- Driveway

5 CONCLUSION

This report details the results of construction noise testing undertaken at the Schools at Meadowbank Education and Employment Precinct.

Construction noise testing was undertaken at site on the Wednesday 15th September 2021 during a period of typical construction activities. The results of the acoustic testing are detailed in this report.

For any additional information please do not hesitate to contact the person below.

Regards,

Matthew Furlong
Senior Acoustic Engineer
PULSE WHITE NOISE ACOUSTICS PTY LTD

APPENDIX A: ACOUSTIC GLOSSARY

The following is a brief description of the acoustic terminology used in this report:

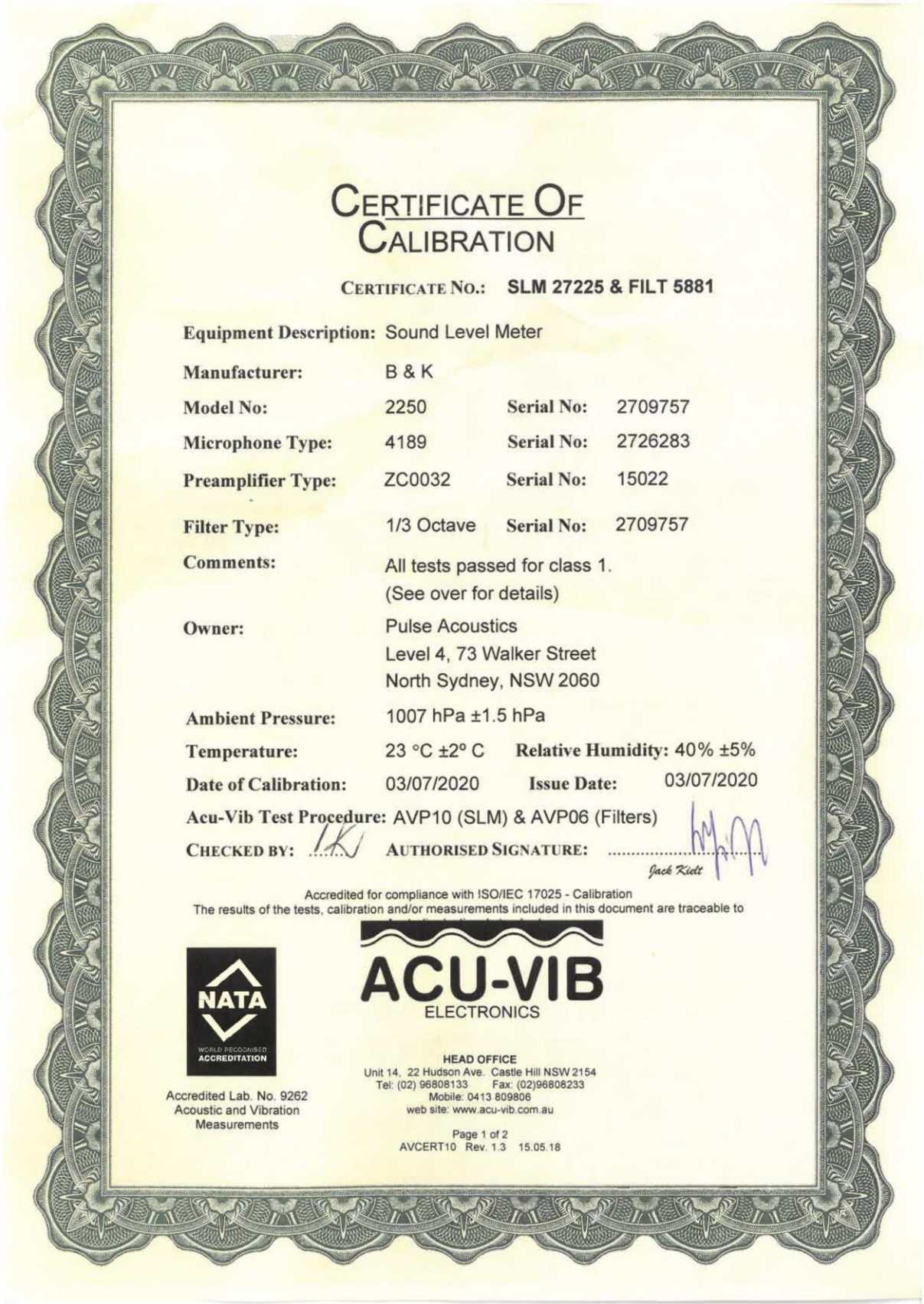
Ambient Sound	The totally encompassing sound in a given situation at a given time, usually composed of sound from all sources near and far.
Audible Range	The limits of frequency which are audible or heard as sound. The normal ear in young adults detects sound having frequencies in the region 20 Hz to 20 kHz, although it is possible for some people to detect frequencies outside these limits.
Character, acoustic	The total of the qualities making up the individuality of the noise. The pitch or shape of a sound's frequency content (spectrum) dictate a sound's character.
Decibel [dB]	The level of noise is measured objectively using a Sound Level Meter. The following are examples of the decibel readings of every day sounds; 0dB the faintest sound we can hear 30dB a quiet library or in a quiet location in the country 45dB typical office space. Ambience in the city at night 60dB Martin Place at lunch time 70dB the sound of a car passing on the street 80dB loud music played at home 90dB the sound of a truck passing on the street 100dB the sound of a rock band 115dB limit of sound permitted in industry 120dB deafening
dB(A)	*A-weighted decibels* The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter. The sound pressure level in dB(A) gives a close indication of the subjective loudness of the noise.
Frequency	Frequency is synonymous to *pitch*. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Loudness	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on
LMax	The maximum sound pressure level measured over a given period.
LMin	The minimum sound pressure level measured over a given period.
L1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L10	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L90	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L_{90} noise level expressed in units of dB(A).
Leq	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
dB (A)	'A' Weighted overall sound pressure level
Sound Pressure Level, LP dB	A measurement obtained directly using a microphone and sound level meter. Sound pressure level varies with distance from a source and with changes to the measuring environment. Sound pressure level equals 20 times the logarithm to the base 10 of the ratio of the rms sound pressure to the reference sound pressure of 20 micro Pascals.
Sound Power Level, Lw dB	Sound power level is a measure of the sound energy emitted by a source, does not change with distance, and cannot be directly measured. Sound power level of a machine may vary depending on the actual operating load and is calculated from sound pressure level measurements with appropriate corrections for distance and/or environmental conditions. Sound power levels is equal to 10 times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power of 1 picoWatt.

APPENDIX B: CALIBRATION CERTIFICATE

Manufacturer: Brüel & Kjær

Model: Hand-held Analyser Type 2250

Serial Number: 2709757 (Unit) & 2726283 (microphone)



CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: **SLM 27225 & FILT 5881**

Equipment Description:	Sound Level Meter		
Manufacturer:	B & K		
Model No:	2250	**Serial No:**	2709757
Microphone Type:	4189	**Serial No:**	2726283
Preamplifier Type:	ZC0032	**Serial No:**	15022
Filter Type:	1/3 Octave	**Serial No:**	2709757
Comments:	All tests passed for class 1. (See over for details)		
Owner:	Pulse Acoustics Level 4, 73 Walker Street North Sydney, NSW 2060		
Ambient Pressure:	1007 hPa ±1.5 hPa		
Temperature:	23 °C ±2° C	**Relative Humidity:**	40% ±5%
Date of Calibration:	03/07/2020	**Issue Date:**	03/07/2020

Acu-Vib Test Procedure: AVP10 (SLM) & AVP06 (Filters)

CHECKED BY: ..... **AUTHORISED SIGNATURE:** .....

Jack Kielt

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to

NATA
WORLD RECOGNISED ACCREDITATION

Accredited Lab. No. 9262
Acoustic and Vibration Measurements

ACU-VIB
ELECTRONICS

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